In the Official Action, the Examiner first acknowledged election of species directed to an embodiment of the invention referred to as "Example 7" with pending Claims 1, 4, 6-7, 9-13, and 17 reading thereon. The Examiner indicated, and applicants acknowledge Claim 8 as not being directed to the elected species of Example 7.

The Examiner further rejected Claim 10 based on a minor informality which is being corrected herein, and further rejected Claims 10 and 11 under 35 U.S.C. §112, second paragraph, on the grounds of comprising terms having improper antecedent basis. Applicants have addressed these rejections by amending Claim 10 to depend upon Claim 4 and amending Claim 11 to set forth a –signal processing unit—as set forth in Claim 1 from which it depends. The Examiner is respectfully requested to withdraw the rejection of Claims 10 and 11 based on 35 U.S.C. §112, second paragraph.

More substantively, the Examiner then rejected Claims 1, 6, 11, 13 and 17 under 35 U.S.C. §103(a) as being unpatentable over JP 5-253180 to Seiji in view of U.S. Patent No. 5,337,340 to Hynecek. The Examiner further rejected the following claims: Claims 4, 10 and 12 under 35 U.S.C. §103(a) as being unpatentable over Seiji in view of Hynecek in further view of U.S. Patent No. 4,951,135 to Sasagawa et al; Claim 7 as being unpatentable over Seiji in view of Hynecek and Sasagawa and further in view of U.S. Patent No. 5,589,874 to Buchin. The Examiner further rejected Claims 4 and 9 as being unpatentable over Seiji in view of Hynecek in further view of JP 7-23278 to Eiichiro et al.

With regard to the rejection of Claim 1 as being obvious over Seiji in view of Hynecek, applicants amend Claim 1 to set forth an endoscope device according to an embodiment of Figure 7 and described with respect to drawing Figures 17-23. Particularly, Claim 1 is being amended to set forth features that are neither taught nor suggested in the prior art combination of Seiji and Hynecek including the feature of a switch means for

causing transmission of excitation light from the light source unit to an object at spectral frequencies enabling object image observation at one of visible wavelengths or fluorescent wavelengths (mode switching element 131, 135 in Figure 17) and that is operable in conjunction with a filter (element 129 in Figure 17) for generating irradiating light to enable detection of object images at visible or fluorescent wavelengths. The Claim 1 has been further amended to clarify the provision of sensitivity control means that varies a sensitivity control pulse applied to a solid-state imaging device for controlling the electron multiplication rate for the solid-state imaging device according to object image observation wavelength. That is, Claim 1 has been amended to additionally set forth that the solid-state imaging device may be modified to vary the solid-state image device electron multiplication rate to enable detection of object images at either the visible or fluorescent wavelengths.

Respectfully, neither Seiji nor Hynecek whether taken alone or in combination teach or suggest the endoscopic device of Claim 1 as amended. That is, with respect to the Seiji (JP 5-253180) reference, the accumulating time of electrons is reduced when changing the sensitivity, and the sensitivity is changed (i.e., the sensitivity is lowered) by not accumulating electrons, which is basically different from the present invention to vary the sensitivity by multiplying electrons and teaches away from the concept of the present invention. (The technique disclosed by Seiji reference may be applied to the conventional CCD.) For the Examiner's convenience, applicants enclose herewith an English translation of the Seiji reference. Furthermore, Hynecek (U.S. Patent No. 5,337,340) appears to be directed to a charge multiplying detector for pixel CCD image sensors which may be used as the CCD device itself for the endoscope in the present invention, as also cited in the present specification at page 12. Hynecek neither discloses nor suggests any control method specialized for the endoscope related to the changing of the sensitivity.

Thus, it is respectfully submitted that it is basically impossible to combine Seiji reference and Hyneck reference in any way and the Examiner is respectfully requested to withdraw the rejection of amended Claim 1 under 35 U.S.C. §103(a) as being unpatentable over Seiji in view of Hynecek, and to withdraw the rejections of all Claims 1, 4, 6-7, 9-13, and 17 by virtue of their dependency thereon.

Given the patentable differences between the present invention and the combination of Seiji and Hynecek references, applicants take this opportunity to add new Claims 20-33 of which Claims 23 and 33 are independent.

It is noted that newly proposed claim 20 is directed to the solid-state imaging device comprising an electron multiplication mechanism in which impact ionization occurs due to the pulsating driving signals applied, and electrons produced under control of the number of pulses per unit time or amplitudes of the pulsating driving signals are multiplied to vary the sensitivity thereof. Respectfully, this is clearly described in the specification in the description of Figures 17-23 and respectfully, no new matter is being entered. New Claim 21 further limits the electron multiplication mechanism as being provided at each pixel location or at an immediately preceding detection amplifier stage. Support for this limitation is found in page 43 of the specification, for example, and respectfully, no new matter is being entered. New Claim 22 is being entered for consideration that is directed to the solid-state imaging device as comprising a first solid-state imaging device for detecting the object image in fluorescent light, and a second sold-state imaging device for detecting the object image in visible light. Support for this limitation is found in page 63, second full paragraph of the specification and respectfully, no new matter is being entered.

New independent Claims 23 and 33 are of similar scope to original Claim 1 and is directed to an endoscope having a solid-state imaging device to which a plurality of

pulsating signals are applied and of which the sensitivity can be varied. In the instance of Claim 23, electron carriers produced are multiplied as a result of varying the pulsating signals. Likewise, in new Claim 33, charge carriers are amplified by varying at least the number of pulses or amplitudes of the pulsing signals to be applied. Respectfully, no new matter is being entered by the language set forth in each of these new Claims 23 and 33. New Claim 33 additionally sets forth further elements directed to enabling the modification of the solid-state imaging device by varying the solid-state image device electron multiplication rate to enable observation of object images at conditions corresponding to either ordinary (visible) light or special (fluorescent) light wavelengths.

These new Claims 23 and 33 are hence alternate embodiments to Claim 1, which is directed to varying the sensitivity control pulse. Clearly, the present invention as set forth in new Claims 23 and 33 is differentiated from Seiji and Hynecek references as described herein.

New Claims 24-32 are additionally being added to further limit new Claim 23, and, it is respectfully submitted, do not constitute new matter.

Specifically, new Claim 24 sets forth an endoscope system wherein the sensitivity of the solid-state imaging device is varied without reducing the effective period during which electrons are accumulated as compared to the case in which the sensitivity is not varied. New Claim 25 sets forth an endoscope system wherein the solid-state imaging device comprises an electron multiplication mechanism in which impact ionization occurs due to the pulsating signals applied, and electrons produced by the control of the number of pulses or amplitudes of the pulsating signals are multiplied to vary the sensitivity thereof. New Claim 26 is directed to an endoscope system wherein the electron multiplication mechanism is provided at each pixel location or at a preceding stage of a detection amplifier. New Claim 27

is directed to an endoscope system wherein the sensitivity control device supplies sensitivity control pulses during a reading period of the solid-state imaging device.

New Claim 28 sets forth an endoscope system having a light source unit comprising: an irradiating lamp, and a filter member having light transmit portions for transmitting light and light interceptive areas to intercept the light from the lamp and, a member to arrange the filter and the interceptive areas of the filter member in the optical path, whereby the sensitivity control device supplies the pulsating signals to the solid-state imaging device when the interceptive areas of the filter are arranged in the optical path.

New Claim 29 is directed to the endoscope system wherein the light source unit further includes: an irradiation light switching device for switching between ordinary light to perform observation under ordinary light and excitation light to perform observation under special light to irradiate the object, and new Claim 30 further limits new Claim 28 by setting forth features of the filter member as comprising a rotary filter having a first filter to transmit the light from said lamp to irradiate the ordinary light to the object, and a second filter to irradiate the special light to the object, and further sets forth the mechanism for arranging the filter as comprising: a motor to rotate the rotary filter; and a filter switching means for switching between the first filter and the second filter arranged in the optical path to switch between the ordinary light and the special light to be irradiated to the object.

New Claim 31 is directed to the endoscope system according to Claim 30, wherein the sensitivity control device varies the pulsating signals such that the electron multiplication rate of the solid-state imaging device in the observation under special light when the special light is irradiated to the object is made larger than that in the observation under ordinary light when the ordinary light is irradiated to said object. As mentioned, this is

a key distinction in that Seiji teaches reducing the accumulating time of electrons when changing the sensitivity.

New Claim 32 further limits Claim 31 by setting forth an iris diaphragm element for adjusting the light level to the light irradiated to the object; and, an iris diaphragm controller for controlling the iris diaphragm according to the filter switching means.

It is respectfully submitted that no new matter is being entered by submission of these claims, and clear support is found in the description of the elected embodiment of Example 7 as found specification from page 40 through the middle of page 65 of the present specification.

Finally, new Claim 33 is being submitted that is directed to an endoscope system comprising an endoscope having a solid-state imaging device to which a plurality of pulsating signals are applied and of which the sensitivity is varied by amplifying charge carriers produced. This is an alternate way of stating that inventive concept that is neither taught nor suggested by the combination of Seiji and Hynecek references as described herein. The new Claim 33 additionally sets forth further elements such as filter switching device, iris diaphragm, iris diaphragm control, and a mode switching device for switching between observation under ordinary light and observation under special light; and a sensitivity control device for varying at least the number of pulses or amplitudes of the pulsing signals to be applied to the solid-state imaging device so as to vary the sensitivity of the solid-state imaging device between the observation under ordinary light and the observation under special light.

In view of the foregoing and in sum, neither Seiji nor Hynecek appears to teach the modification and control of CCD sensitivity according to either a plurality of applied pulses per unit time and pulse amplitude levels in each of the inventive embodiments as set

forth in independent Claim 1 and new Claims 23 and 33. As such, applicants respectfully request entry of new Claims 23 –33 and respectfully seek allowance of new Claims 23-33.

Attached hereto is a marked-up version of the changes made to the application by the current amendment. The attached page is captioned **"Version with Markings to Show Changes Made."**

In view of the foregoing remarks herein, it is respectfully submitted that this application is in condition for allowance. Accordingly, it is respectfully requested that this application be allowed and a Notice of Allowance be issued.

If the Examiner believes that a telephone conference with the Applicant's attorneys would be advantageous to the disposition of this case, the Examiner is requested to telephone the undersigned.

Respectfully submitted,

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Serial No: 09/743,994 **Docket: 14198**

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Please amend the paragraph in the specification on page 47, lines 1-9 as follows:

--Portions of the first [filer] filter set 133 among the filters 133a, 133b, and 133c that pass the red (R1), green (G1), and blue (B1) rays required for the ordinary light mode (observation under ordinary light) are interceptive areas. The interceptive areas determine the interception period (reading period) during which the CCD 109 is read. The filters 113a, 133b, and 133c and the interceptive areas are arranged nearly equidistantly. The same applies to the second filter set 134.--

Please amend the paragraph in the specification on page 57, line 19 – page 58, line 5 as follows:

--Light reflected from a living tissue to which excitation light is irradiated, and light stemming from fluorescence exhibited by (for example, NADH or flavin contained in) the living tissue excited by the excitation light falls on the objective 108. The [filer] filter 110 cuts off the reflected light of the excitation light. The light stemming from fluorescence enters the CCD 109. An image signal picked up from the light stemming fluorescence by the CCD 109 is fed to the signal processing means 114. The signal processing means 114 processes the image signal derived from the light passing through the filter 134b (G2), and outputs the resultant signal to the monitor 105.--

IN THE CLAIMS:

Please amend Claims 1, 10 and 11 as follows:

1. (Amended) An endoscope system comprising:

an endoscope having a solid-state imaging device whose sensitivity can be varied by providing a plurality of pulsating driving signals so as to change an electron multiplication rate;

a signal processing unit for processing a signal output from said solid-state imaging device;

a light source unit for irradiating light to an object so that an object image will be projected on said solid-state imaging device;

switch means for causing transmission of excitation light from said light source unit to an object at spectral frequencies enabling object image observation at one of visible wavelengths or fluorescent wavelengths; and

a sensitivity control means for varying a sensitivity control pulse, applying it to said solid-state imaging device, and thus controlling the electron multiplication rate for said solid-state imaging device according to object image observation wavelength.

10. (Twice Amended) An endoscope system according to Claim [1] 4, wherein the information representing a feature of a connected endoscope with which said sensitivity control means [many] may be controlled is input at an input means.

11. (Twice Amended) An endoscope system according to Claim 1, wherein said signal processing [means] unit includes a means that when an output signal of said solid-

state imaging device is lower than a set voltage level, amplifies a gain to be given to the signal.

Please add new Claims 20-33.

--20. (New) An endoscope system according to Claim 1, wherein the solid-state imaging device comprises an electron multiplication mechanism in which impact ionization occurs due to the pulsating driving signals applied, and electrons produced under control of the number of pulses per unit time or amplitudes of the pulsating driving signals are multiplied to vary the sensitivity thereof.

21. (New) An endoscope apparatus according to Claim 20, wherein the electron multiplication mechanism is provided at each pixel location or at an immediately preceding detection amplifier stage.

22. (New) An endoscope apparatus according to Claim 1, wherein the solid-state imaging device comprises a first solid-state imaging device for detecting the object image in fluorescent light, and a second sold-state imaging device for detecting the object image in visible light.

23. (New) An endoscope system comprising:

an endoscope having a solid-state imaging device to which a plurality of pulsating signals are applied and of which the sensitivity is varied by multiplying electrons produced;

a signal processing unit for processing an output signal from the solid-state imaging device;

a light source unit for irradiating light to an object so that an object image will be projected on the solid-state imaging device; and

a sensitivity control device for varying the pulsating signals, applying them to the solid-state imaging device, and thus controlling the electron multiplication rate for the solid-state imaging device.

24. (New) An endoscope system according to Claim 23, wherein, when the electrons produced are multiplied, the sensitivity of the solid-state imaging device is varied without reducing the effective period during which electrons are accumulated as compared to the case in which the sensitivity is not varied.

25. (New) An endoscope system according to Claim 23, wherein the solid-state imaging device comprises an electron multiplication mechanism in which impact ionization occurs due to the pulsating signals applied, and electrons produced by the control of the number of pulses or amplitudes of the pulsating signals are multiplied to vary the sensitivity thereof.

26. (New) An endoscope system according to Claim 25, wherein the electron multiplication mechanism is provided at each pixel location or at a preceding stage of a detection amplifier.

27. (New) An endoscope system according to Claim 23, wherein the sensitivity control device supplies sensitivity control pulses during a reading period of the solid-state imaging device.

28. (New) An endoscope system according to Claim 27, wherein the light source unit comprises:

a lamp for irradiating light to the object;

a filter member provided in an optical path between the object and the lamp and having a filter to transmit the light from the lamp to irradiate the object and interceptive areas to intercept the light from said lamp and, a mechanism for arranging the filter and the interceptive areas of the filter member in the optical path,

wherein the sensitivity control device supplies the pulsating signals to the solid-state imaging device when the interceptive areas of the filter are arranged in the optical path.

29. (New) An endoscope system according to Claim 27, wherein the light source unit further includes:

an irradiation light switching device for switching between ordinary light to perform observation under ordinary light and excitation light to perform observation under special light to irradiate the object, wherein the sensitivity control device renders the electron multiplication rate of the solid-state imaging device different according to whether the excitation light is irradiated to the object or whether the ordinary light is irradiated to the object.

30. (New) An endoscope system according to Claim 28, wherein the filter member comprises a rotary filter member having a first filter to transmit the light from said lamp to irradiate the ordinary light to the object, and a second filter to irradiate the special light to the object, said mechanism for arranging the filter further comprising:

a motor to rotate the rotary filter; and

a filter switching means for switching between the first filter and the second filter arranged in the optical path to switch between the ordinary light and the special light to be irradiated to the object, wherein the sensitivity control device renders the electron multiplication rate of the solid-state imaging device different between the ordinary light and the special light.

31. (New) An endoscope system according to Claim 30, wherein the sensitivity control device varies the pulsating signals such that the electron multiplication rate of the solid-state imaging device in the observation under special light when the special light is irradiated to the object is made larger than that in the observation under ordinary light when the ordinary light is irradiated to said object.

32. (New) An endoscope system according to Claim 31, wherein the light source unit comprises:

an iris diaphragm which adjusts light level to the light irradiated to the object; and,

an iris diaphragm controller for controlling the iris diaphragm wherein the iris diaphragm controller controls the iris diaphragm such that the iris diaphragm is opened when

the light irradiated to the object is switched by the filter switching means from the ordinary light to the special light.

33. (New) An endoscope system comprising:

an endoscope having a solid-state imaging device to which a plurality of pulsating signals are applied and of which the sensitivity is varied by amplifying charge carriers produced;

a signal processing unit for processing an output signal from the solid-state imaging device;

a light source unit for irradiating light to an object, the light source unit includes a lamp for irradiating light to the object;

a filter member provided between the object and the lamp and having a first filter to transmit the light from the lamp to irradiate ordinary light to the object and a second filter to irradiate excitation light to the object;

a switching device for switching between the first filter and the second filter so as to selectively arrange the first filter and the second filter between the object and the lamp;

an iris diaphragm which adjusts light level of the light irradiated to the object and an iris diaphragm control device for controlling the iris diaphragm;

a mode switching device for switching between observation under ordinary light to irradiate ordinary light to the object by arranging the first filter between the object and the lamp and observation under special light to irradiate excitation light to the object by arranging the second filter between the object and the lamp; and

a sensitivity control device for varying at least the number of pulses or amplitudes of the pulsing signals to be applied to the solid-state imaging device so as to vary

the sensitivity of the solid-state imaging device between the observation under ordinary light and the observation under special light,

wherein the iris diaphragm control device controls the iris diaphragm opening when the light irradiated to the object is switched by the filter switching mechanism from the ordinary light to the special light.--